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1. Introduction

At present, there is expected to be about 7 billion people in the entire world, and it is predicted that it will rise by 3 billion in 40 years and reach 10 billion in 2050[1]. While the world is seeing an enormous population growth, there is also a significant increase in the demand for food production. However, as the various changes occur in all walks of life impede the production of food stuffs and in such a situation. It becomes wonder, if demand for food matches the increasing population every single day**.** An integrated analysis of the agriculture and foodstuff manufacture sectors shows that they cannot satisfy population needs, because they are complex processes, which require smart agriculture[1][2]. In view of a number of issues, such as insufficient agricultural land available, climate change, absence of fresh water, price rises and energy supply decrease, etc., the present agricultural scenario is being disrupted[3]. Moreover, agriculture is affected by the urbanization that results in a shortage of human resources, especially labor supply. Another major problem is that young people in the country are smart and working to find a job somewhere else to work. These factors resulted in which food manufacture is in decline, although it should have been the other way round. In many ways, conventional agriculture and smart agriculture are vary. Traditional farming follows traditional farming methods; on the other hand, smart agriculture studies are ongoing with the application of state-of - the-art agricultural technology [4]. The agriculture is made easy, cost-effective, reduces labor and improves crop production.

Smart Agriculture

Most of the recent advances and Smart in agriculture fields made by researchers are closely connected to production and every other part of agriculture for the purposes of improving productivity of crops, reducing and preparing for the plant diseases, boosting mechanized and automated modern agriculture and agro-industry[6]. Appling Deep learning (DL) and Machine learning (ML) approach for image recognition or data classification can be summarized as data collection and data pre-processing, neural network training, model testing, prediction etc. Internet of Things (IoT) can provide high quality datasets of images and other forms. These data greatly enhance applications of deep learning in agriculture and improve the accuracy of resulting tools. Training and learning algorithms can enhance the accuracy, especially for those applications that require high precision. It implies that more challenges and opportunities remain in the area and more efforts are needed.

Agro-Cloud: Agro-Cloud is main part of the smart agriculture. This can be used to manage the overall functionalities of the system. With the help of internet, all the users can get Agro-Cloud services from any village or city of country.

- E-Data Bank: It is a central data bank and it can be used to store all the agriculture related information in a centralized cloud, which will be available to all the users at anytime, anywhere. The main concept behind having an e-data bank is to disseminate vital information to the local farmers in decision making.
- Demand-supply: It can provide a platform for a comparative analysis of the demand and supply of agriculture product. It help farmer and foodstuff manufacturer for their business related design.
- Research opportunity: It provides opportunity to researchers to extort agricultural data form E-Data Bank. Their findings also are kept in system. This findings of researchers very useful for the new research.

Smart Tools

- **IOT:** In view of the current drop in food production in agriculture, it is time to move towards different agricultural technologies to solve the problems and therefore the current work is one such agricultural technological advance which can provide solutions to various questions under discussion. In particular, a combination of various components communicating via a wireless sensor network via a sensor system is proposed in the Agriculture Internet of Things (IoT).

  The sensors receive the crop surveillance data and send it to the server. When the soil moisture is below the threshold values, the server will perform such watering actions. These are done without manual intervention by the server automatically. Pesticides used in drones to control the pest and modern machinery for traditional production, soil management and water management.
- **Cloud Computing:** Cloud-based agricultural architecture contains different services for agriculture and farmers, such as agricultural monitoring, market-oriented service, storage data, support for agri-business development network, information services for the farmers and so on. The system has features like minimization of farm expenditures, minimum labor, time consumption and improvement, information on marketing, banking and financing, the exchange of information between farmers, advice by scientists on pest control, suitability of crop for a particular soil.

Web Portal Service provides the farmers and their community with a single window solution for web portals facilitates information sharing and usage to reduce total investment, operating costs and an increase in service coverage.

Voice Based Service consists of communicating voice talks on the Internet. Farmers can use mobile phones to access information from anywhere and at any time. Currently, India has a very high rate of rural mobile / telephone penetration. The voice is a key channel for contacting farmers at this time. Farmers may make use of this service and receive software and modern methods of farming.

Text (SMS) based Service is that the farmer's community can take advantage of from the outside network is quick, fast and cheaper. Most farmers now have mobile telephones in India. Messages can be sent and received by farmers and receive advice or assistance from the experts concerned.

Farming Community online chatting service provide farmers and other members can build up a society for mutual aid. The mail stakeholder is farmers in these community agricultural associates include bankers, agricultural government agents, crops insurance agents, agricultural scientists, researchers, etc.

Interactive Video Conferencing Service for farmers is highly efficient. Farmers can watch videos from related agriculture, such as how modern farm machinery is used, and use it for your practice. This model has the most striking features in its visual interaction with each other.

Mobile Internet-based Service is omnipresent, portable and geographic. Farmers on the move or located in any agricultural field may access agricultural information.

Unified Multi-Channel Service model provide an integrated service model facilitates the transfer of information via multiple communication channels. This unified multi-channel model provides information transfer in a single way (e.g. portal, SMS) and in two ways (e.g. two-way communications facilitated by audio and visual communications, an online community and mobile Internet service).

- **Big Data**: Big Data is expected to have a large impact on agriculture. Smart sensors and devices produce big amounts of data that provide decision-making capabilities.

  These can truly reform the agricultural sector and It is also the link between innovation and social biology and human conflicts. Big Data tools are capable to combine data on climate, agronomy, water, farm equipment, supply chain and so much more to aid the farmer make decisions. It is expected to have a large impact on agriculture, foodstuffs and involves the whole supply chain.

2. Literature Review.

- Jarek et al.. (2014). define an infrastructure where physical and logical data are separated and implement a high-level query meta-language allowing to executed on complex data layer. Achieved through Web Map Service, Web Feature Service and RESTful APIs for data.[38]
- Nengfu et al.. (2015). proposed an ontology-based agriculture knowledge fusion method. Author divides knowledge fusion into attribute fusion, instance fusion and concept fusion. [32]
- Tameem et al.. (2015). proposed DA(Digital Avatar) the architectural configuration of resources, infrastructure, experiences, and services in the digital form with help of Infrastructure as a services, Platform as a services and Software as a services.[39]
- Kehua xian iJOE (2017). proposed a new online monitoring system for agriculture based on cloud computing. With the help of Amazon relational database service(RDS) and Zigbee perception network.[40]
- Jaiganesh et al.. (2017). shows role of IOT, Sensors, cloud computing in precision agriculture, Design agriculture virtualized information database and big data help in food & agriculture.[41]
- Ashifuddin et al..(2018). design an IoT based smart farming in which Sensor layer, Middleware, Communication layer and Cloud & Application layer to control high voltage electrical device, with the help of ThingSeak Cloud to store Field Data (like temperature ,soil moisture etc).[42]
- Gurjit et al.. (2018). proposed architecture for smart cities which will use Cloud-IoT system.[37]
- Ming-shen et al.. (2018). proposed agriculture safety inspection architecture with help of cloud computing, Web Crawler and Chromatography-tandem mass spectrometry and pesticide check algorithm.[36]
- Shadi Alzubi et al.. (2019). proposed system focuses on training the computer system on the acquired Multimedia data and sensed information, resulting in an optimized irrigation decision based on the employment of Digital Image Processing (DIP) and IoMT.[35]
- Ion Bica et al.. (2019). proposed cloud based architecture in which presentation layer, Gateway layer and application layer with MQTT protocol in presentation layer.[43]
- Georege et al.. (2019).proposed a System under analysis (SUA) collects data from the vineyard and presents it to users through Web services. The users of SUA can be vineyard

owners or public authorities. Vineyard owners: remotely read sensor data for observing the status of the vineyard and issue commands to the actuator for performing some farming activity, for instance, irrigation. Public authorities: collect sensor data from multiple vineyards in an area to perform long-term agriculture planning or management.[34]

- Lei et al.. (2019).design three layer application, network and sensing. Device-aware data acquisition, intelligent gateway, Multi protocol data transmission, storage & real time monitoring of cloud data and third party support.[33]
- Bhanumathi, V. & Kalaivanan, K. (2018) predict the critical parameters such as water quality, soil condition, ambient temperature and moisture, irrigation, and fertilizer for improving the crop production.[15]
- Jain, V. K. et al.. (2018). explain framework promotes a fast development of agricultural modernization, realize smart agriculture and effectively solve the problems concerning agriculture, countryside, and farmers.[14]
- Ram Kumar et al(2018) study implies that incorporating drones transforms the traditional method of farming into Smart Farming.[13]
- Koshy, S. S. et al.(2018)This paper describes how the *IoT* can be customized to local needs, particularly adapting to farming conditions of small and marginal farmers in India.[12]
- Waga and Rabah (2014) and Coble et al. (2018) proposed Big data essential for genetic sympathetic, increased productivity, food safety analysis and livelihood, and disaster resilience as well as interactions between different factors and agriculture.[7]
- Van and Woodard (2017) and Xie et al. (2015) Big data enables virtual farming that can affect the intelligent use of agricultural sustainable data.[8]

3. Rationale

Farming has increasingly supported with Smart Tools. The focuses on smartest technological investment are needed in agriculture development. The rising need for food increased the need for the agriculture industry to become stronger and more industrial.

Proposed research experimental measurement findings on smart tools help in remote agricultural, food production manufacturer and population in the telemetry submissions.

Proposed research will show that how large-scale data dispensation and a decentralized cloud operating concept meet the requirements of agriculture and will be help farmers to work more

resourcefully and safely. It will dependent on Remote Telemetry Units (RTUs), Software as a Service (SaaS), and the influxDB Platform as a Service (PaaS).

4. Objectives

The main objectives of this research are:

- To collect and study Smart Agro-Cloud data.
- To design a Smart Agriculture Architecture using cloud based approach.
- To develop learning algorithm for smart agricultural.
- To compare and verify proposed learning algorithm with existing algorithm reported by other researches.

5. Research Methodology

Stages of the data chain	State of the art	Key issues
(a) Collect and Study Data	• Sensors • Open data	Data Visualization
(b) Data Storage	• Cloud based platform,	Quick and safe access to data
(c) Data Transformation	• Normalize	Information origins diversity, information purification and planning automation
(d) Data Analytics	• Ontology of decisions • Cognitive computing	Semantic heterogeneity, real-time analytics, scalability
(e) Data Reporting	• Data visualization	Ownership, privacy, new business models

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